

Highly Efficient, Solid State Hydrogen Purification for Resource Recovery, Phase II

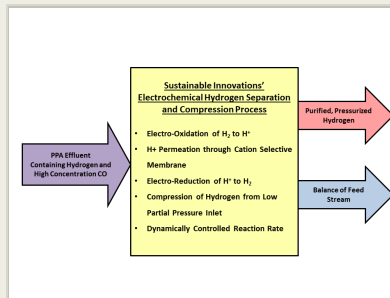
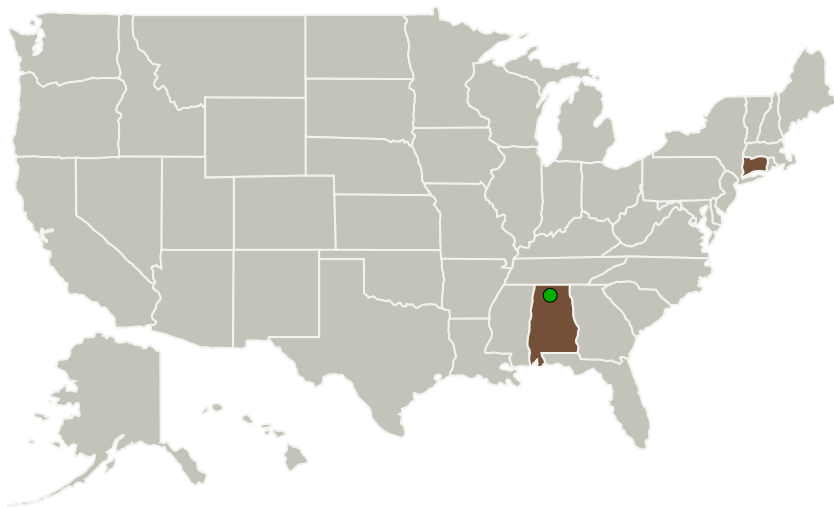
Completed Technology Project (2015 - 2017)



Project Introduction

Long duration manned space exploration requires further closure of the oxygen loop of the life support system than is currently realized aboard the International Space Station. In order to further close the oxygen loop, NASA has been developing an advanced Plasma Pyrolysis (PPA) technology that reduces the waste methane to higher order hydrocarbons in order to better utilize the hydrogen for oxygen recovery. In order for this PPA technology to be feasible, there must be a means to separate the hydrogen from the other compounds for recycle to the Sabatier reactor. Sustainable Innovations' signature electrochemical cell architecture embodied in A Highly Efficient, Solid State Hydrogen Purification System for Resource Recovery (HRR), provides a solution to NASA's search for regenerative separation technology enabling maximum hydrogen recovery from a stream containing water vapor, carbon monoxide (CO), and hydrocarbons including methane, acetylene, ethane, and ethylene, among others. During the Phase II effort, Sustainable Innovations will design and fabricate a full-scale prototype four crew-member (4-CM) unit, optimizing hydrogen utilization, weight and volume, and enabling full integration of the HRR with PPA and Sabatier systems.

Primary U.S. Work Locations and Key Partners



Highly Efficient, Solid State Hydrogen Purification for Resource Recovery, Phase II

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

Highly Efficient, Solid State Hydrogen Purification for Resource Recovery, Phase II

Completed Technology Project (2015 - 2017)



Organizations Performing Work	Role	Type	Location
Sustainable Innovations, LLC	Lead Organization	Industry	East Hartford, Connecticut
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama
Skyre Inc	Supporting Organization	Industry Small Disadvantaged Business (SDB)	

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Sustainable Innovations, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Trent Molter

Co-Investigator:

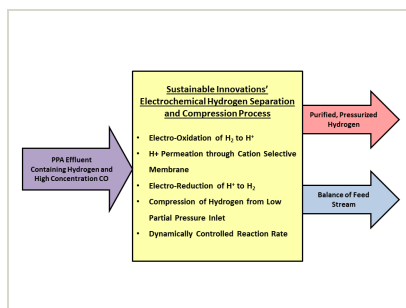
Trent Molter

Primary U.S. Work Locations

Alabama

Connecticut

Images



Briefing Chart Image

Highly Efficient, Solid State
Hydrogen Purification for Resource
Recovery, Phase II

(<https://techport.nasa.gov/image/127325>)

Highly Efficient, Solid State Hydrogen Purification for Resource Recovery, Phase II

Completed Technology Project (2015 - 2017)



Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
 - └ TX06.1.1 Atmosphere Revitalization

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System